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Solving Nonlinear Heat Transfer Constant Area Fin Problems

Tables and graphs have been compiled concerning functions necessary for solving nonlinear heat transfer constant area fin problems. Examples have been determined for their use by means of sample problems.

The differential equation describing the one-dimensional steady-state temperature distribution and heat flow under the three modes of heat transfer and with heat generation has been investigated. It has been shown that the constant area rod or fin case with temperature dependent physical properties and heat generation can be solved exactly. The solution, however, has to be determined separately for each case depending on the functions describing the dependence of the physical properties and the heat generation on temperature. When the physical properties are constants and the heat generation per unit volume:

(a) is constant, (b) varies linearly with temperature, (c) is proportional to the fourth power of temperature, or (d) varies according to a combination of the three cases above; the solution leads to the definition of two functions of parametric nature. Each function has four parameters that are dependent on the boundary conditions.

Note:

Documentation for the innovation is available from:
Clearinghouse for Federal Scientific
and Technical Information
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Patent status:

No patent action is contemplated by NASA.

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